## CLAIMS

What is claimed is:

1. A process of making a composite article comprising:

   providing a trilayer structure comprising:

   a first electrode layer,

   an electrolyte layer,

   a second electrode layer,

   sintering the trilayer structure.

2. A process of making a composite article as claimed in claim 1, wherein

   the first electrode layer comprises one or more electronic and/or MIEC and an ionic conductor or MIEC,

   the electrolyte layer comprises predominately an ionically conducting electrolyte material, and

   the second electrode layer comprising one or more electronic and/or MIEC and an ionic conductor or MIEC.

3. A process of making a composite article as claimed in claim 2, wherein the MIEC is non-reactive with the electrolyte layer material at the sintering temperature of the composite article.

4. A process of making a composite article as claimed in claim 1, wherein the first and/or second electrode comprise particles that are larger than about .25 $\mu$m but less than about 10 $\mu$m.

5. A process of making a composite article as claimed in claim 1, wherein

the electrolyte layer has a porosity of less than 5%.

6. A process of making a composite article as claimed in claim 1, wherein the electrode layers have a porosity of greater than 20 % but less than about 60%.
7. A process of making a composite article as claimed in claim 1, wherein the trilayer structure is affixed to a substrate.
8. A process of making a composite article as claimed in claim 7, wherein the substrate comprises a porous non-noble transition metal, a porous non-noble transition metal alloy or a porous cermet incorporating one or more of a non-noble non-nickel transition metal and a non-noble transition metal alloy.
9. A process of making a composite article as claimed in claim 1, wherein the sintering is conducted at a temperature sufficient to substantially sinter and densify the electrolyte layer without melting the electrodes.
10. A process of making a composite article as claimed in either of claims 1 or 9, wherein the sintering is conducted at about 1000 °C to about 1500 °C.
11. A process of making a composite article as claimed in claim 10, wherein the sintering is conducted at about 1200 °C to about 1400 °C.
12. A process of making a composite article as claimed in claim 11, wherein the sintering is conducted at about 1250 °C to about 1350 °C.
13. A process of making a composite article as claimed in claim 1, wherein the sintered electrolyte layer is gas-tight and greater than about 90% densified.
14. A process of making a composite article as claimed in claim 1, wherein the sintered electrolyte layer is gas-tight and greater than about 95% densified.

15. A process of making a composite article as claimed in claim 1, wherein the sintered electrolyte layer is no more than 2% porous.
16. A process of making a composite article as claimed in claim 1, wherein the sintered electrolyte layer is about 1 to 50 microns thick.
17. A process of making a composite article as claimed in claim 16, wherein the sintered electrolyte layer is about 3 to 30 microns thick.
18. A process of making a composite article as claimed in claim 17, wherein the sintered electrolyte layer is about 5 to 20 microns thick.
19. A process of making a composite article as claimed in claim 1, wherein said trilayer structure is planar.
20. A process of making a composite article as claimed in claim 1, wherein said trilayer structure is tubular.
21. A process of making a composite article as claimed in claim 1, wherein said trilayer structure is hexagonal.
22. A process of making a composite article as claimed in claim 7, wherein said substrate is an alloy selected from the group consisting of a low-chromium ferritic steel, an intermediate-chromium ferritic steel, a high-chromium ferritic steel, a chrome-based alloy, and chrome-containing nickel-based Inconel alloy.
23. A process of making a composite article as claimed in claim 22, wherein said alloy is selected from the group consisting of Cr5Fe1Y and Inconel 600.

24. A process of making a composite article as claimed in claim 7, wherein said substrate material is a cermet selected from the group consisting of at least one of $La_{1-x}Sr_xMn_yO_{3-\delta}$ $(1 \geq X \geq 0.05)$ $(0.95 \leq y \leq 1.15)$ ("LSM"), $La_{1-x}Sr_xCoO_{3-\delta}$ $(1 \geq X \geq 0.10)$ ("LSC"), $SrCo_{1-x}Fe_xO_{3-\delta}$ $(0.30 \geq X \geq 0.20)$, $La_{0.6}Sr_{0.4}Co_{0.6}Fe_{0.4}O_{3-\delta}$, $Sr_{0.7}Ce_{0.3}MnO_{3-\delta}$, $LaNi_{0.6}Fe_{0.4}O_{3-\delta}$, $Sm_{0.5}Sr_{0.5}CoO_{3-\delta}$, yttria stabilized zirconia (YSZ), scandia stabilized zirconia (SSZ), $(CeO_2)_{0.8}(Gd_2O_3)_{0.2}$ (CGO), $La_{0.8}Sr_{0.2}Ga_{0.85}Mg_{0.15}O_{2.825}$ (LSGM20-15), $(Bi_2O_3)_{0.75}(Y_2O_3)_{0.25}$ and alumina, in combination with at least one of transition metals Cr, Fe, Cu, Ag, an alloy thereof, a low-chromium ferritic steel, an intermediate-chromium ferritic steel, a high-chromium ferritic steel, a chrome-based alloy, and chrome-containing nickel-based Inconel alloy.
25. A process of making a composite article as claimed in claim 24, wherein the LSM is selected from the group consisting of $La_{0.8}Sr_{0.2}MnO_{3-\delta}$, $La_{0.65}Sr_{0.30}MnO_{3-\delta}$, $La_{0.45}Sr_{0.55}MnO_{3-\delta}$.
26. A process of making a composite article as claimed in claim 25, wherein said chrome based alloy is Cr5Fe1Y.
27. A process of making a composite article as claimed in claim 1, wherein said electrolyte comprises at least one of yttria stabilized zirconia (YSZ), scandia stabilized zirconia (SSZ), doped cerium oxide including $(CeO_2)_{0.8}(Gd_2O_3)_{0.2}$ (CGO), $La_{0.8}Sr_{0.2}Ga_{0.85}Mg_{0.15}O_{2.825}$ (LSGM20-15) and $(Bi_2O_3)_{0.75}(Y_2O_3)_{0.25}$.
28. A process of making a composite article as claimed in claim 27, wherein said electrolyte is yttria stabilized zirconia.

29. A process of making a composite article as claimed in claim 28, wherein said yttria stabilized zirconia is $(ZrO_2)_x(Y_2O_3)_y$ where $(.88 \geq X \geq .97)$ and $(.03 \leq y \leq .12)$.

30. A process of making a composite article as claimed in claim 29, wherein said yttria stabilized zirconia is at least one of $(ZrO_2)_{0.92}(Y_2O_3)_{0.08}$ and $(ZrO_2)_{0.90}(Y_2O_3)_{0.10}$.

31. A process of making a composite article according to claim 1, wherein the electrolyte is a mixed ionic electronic conductor.

32. A process of making a composite article as claimed in claim 31, wherein said electrolyte comprises at least one of $SrCo_{1-x}Fe_xO_{3-\delta}$ $(0.30 \geq X \geq 0.20)$, $La_{0.6}Sr_{0.4}Co_{0.6}Fe_{0.4}O_{3-\delta}$, $Sm_{0.5}Sr_{0.5}CoO_{3-\delta}$ and $La_{1-x}Sr_xCoO_{3-\delta}$.

33. A process of making a composite article as claimed in claim 32, wherein said electrolyte is $SrCo_{0.75}Fe_{0.25}O_{3-\delta}$.

34. A process of making a composite article as claimed in claim 1, wherein the composite article has an ohmic area specific resistance from about 0.5 ohm cm$^2$ to about .05 ohm cm$^2$ during operation of the composite article.

35. A composite article made according to the process of claim 1, wherein the composite article has an ohmic area specific resistance of from about 0.5 ohm cm$^2$ to about .25 ohm cm$^2$ during operation of the composite article.

36. A composite article made according to the process of claim 1, wherein the composite article has an ohmic area specific resistance of less than about .05 ohm cm$^2$ during operation of the composite article.

37. A solid oxide fuel cell made according to the process of claim 1.

38. A process of making a solid oxide fuel cell comprising:

providing a trilayer structure comprising:

a first electrode layer,

an electrolyte layer,

a second electrode layer,

sintering the trilayer structure.